1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about 1,1,1-trichloroethane and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,408 hazardous waste sites as the most serious in the nation. These sites make up the National Priorities List (NPL) and are the sites targeted for long-term federal clean-up activities. 1,1,1-Trichloroethane has been found in at least 696 of the sites on the NPL. However, the number of NPL sites evaluated for 1,1,1-trichloroethane is not known. As EPA evaluates more sites, the number of sites at which 1,1,1-trichloroethane is found may increase. This information is important because exposure to 1,1,1-trichloroethane may cause harmful health effects and because these sites are potential or actual sources of human exposure to 1,1,1-trichloroethane.

When a substance is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. This release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking substances containing the substance or by skin contact with it.

If you are exposed to a substance such as 1,1,1-trichloroethane, many factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, lifestyle, and state of health.

1.1 WHAT IS 1,1,1-TRICHLOROETHANE?

1,1,1 -Trichloroethane is a synthetic chemical that does not occur naturally in the environment. It is also known as methylchloroform, methyltrichloromethane, trichloromethylmethane, and a-trichloromethane. Its registered trade names are chloroethene NU® and Aerothene TT®. It

is a colorless liquid with a sweet, sharp odor. 1,1,1 -Trichloroethane dissolves slightly in water. The liquid evaporates quickly and becomes a vapor in the air. Most people begin to smell 1,1,1-trichloroethane in the air when levels reach 120 to 500 parts of 1,1,1-trichloroethane per one million parts of air (ppm). If the chemical makes up 8 to 10.5% (80,000 to 105,000 ppm) of the air, 1,1,1-trichloroethane can bum easily when it comes in contact with a spark or flame. If the vapor bums at high temperatures such as those produced during welding operations, it can produce a poisonous gas known as phosgene. Because of its tendency to evaporate easily, the vapor form is most commonly found in the environment. 1,1,1-trichloroethane also can be found in soil and water, particularly at hazardous waste sites.

1,1,1 -Trichloroethane is used in commercial products, mostly to dissolve other chemicals. About 800 million pounds were produced in 1990, but less is being made today. By the year 1996, 1,1,1-trichloroethane will no longer be made in the United States because it affects the ozone layer. 1,1,1-Trichloroethane has many industrial and household uses. It is often used as a solvent to dissolve other substances, such as glues and paints. In industry, it is widely used to remove oil or grease from manufactured metal parts. In the home, it may be an ingredient of products such as spot cleaners, glues, and aerosol sprays.

You will find detailed information on the chemical properties of 1,1,1 -trichloroethane in Chapter 3. Chapter 4 describes production data and the uses of 1,1,1-trichloroethane.

1.2 WHAT HAPPENS TO 1,1,1-TRICHLOROETHANE WHEN IT ENTERS THE ENVIRONMENT?

Most of the 1,1,1-trichloroethane released into the environment enters the air, where it lasts for about 6 years. Once in the air, it may travel to the upper part of the earth’s atmosphere, which is called the stratosphere. There, sunlight breaks it down into other chemicals that may reduce the stratospheric ozone layer. This ozone layer blocks certain damaging ultraviolet rays of the sun from reaching the earth’s surface. Some scientists think that the gradual

thinning of the ozone layer is causing increases in the number of skin cancer cases in humans.

Spills, improper disposal, industrial emissions, and consumer use can release large amounts of 1,1,1 -trichloroethane into the environment. Contaminated water from landfills and hazardous waste sites may contaminate surrounding soil and nearby surface water or groundwater. However, most of the chemical will probably eventually evaporate into the air. It will not build up in plants or animals. Industrial operations release the largest amount of 1,1,1-trichloroethane into the environment, mostly by emissions into the air. The vapor also enters the air because many products containing the chemical are used in the home and workplace.

We do not know how long 1,1,1-trichloroethane lasts in water or soil. In surface waters such as lakes and rivers, where it partially mixes with water, much of the chemical evaporates quickly into the air. 1,1,1-Trichloroethane also evaporates into the air from soil surfaces. Water can easily carry it through soil into groundwater. 1,1,1 -Trichloroethane in groundwater may evaporate and pass through soil as a gas and finally be released to the air. Also, organisms that live in soil and water may break down 1,1,1-trichloroethane. One study suggests that it takes 200 to 300 days for half of the chemical in contaminated groundwater to break down. However, the number of days may vary widely, depending on specific site conditions.

Chapter 5 provides further information on what happens to 1,1,1-trichloroethane in the environment.

1.3 HOW MIGHT I BE EXPOSED TO 1,1,1-TRICHLOROETHANE?

You can be exposed to 1,1,1-trichloroethane daily from a variety of sources. 1,1,1-Trichloroethane has been found in air samples taken from all over the world. In the United States, city air typically contains about 0.1 to 1.0 parts per billion (ppb) of 1,1,1-trichloroethane; rural air usually contains less than 0.1 ppb. Because 1,1,1-trichloroethane is used so frequently in

home and office products, much more is usually found in the air inside buildings (0.3 to 4.4 ppb) than in the outside air (0.1 to 0.9 ppb). Since this chemical is found in many building materials, new buildings can have higher indoor levels than old buildings. Thus, you are likely to be exposed to 1,1,1-trichloroethane vapor at higher levels indoors than outdoors or near hazardous waste sites.

Common consumer products that contain 1,1,1-trichloroethane include glues, household cleaners, and aerosol sprays. In the workplace, you may be exposed to 1,1,1-trichloroethane while using some metal degreasing agents, paints, glues, and cleaning products. You can be exposed to 1,1,1 -trichloroethane by breathing the vapors from these products or by letting the liquid come into contact with your skin. High levels of exposure have occurred in persons who deliberately inhaled the vapors, as in glue-sniffing or solvent abuse.

1,1,1-Trichloroethane has been found in rivers and lakes (up to 0.01 ppm), in soil (up to 120 ppm), in drinking water (up to 0.0035 ppm), and in drinking water from underground wells (up to 5.4 ppm). In one case, drinking water from a private well contained up to 12 ppm, possibly as a result of illegal discharge or spill from a nearby industrial plant. Releases during manufacture and transportation, and during industrial or household use can cause these high levels, but the levels vary substantially from one location to another. Certain foods you eat and water you drink or bathe in may be contaminated with 1,1,1-trichloroethane. However, you can be exposed to 1,1,1-trichloroethane primarily by drinking contaminated water and eating contaminated food. Chapter 5 discusses further information on human exposure to 1,1,1 -trichloroethane.

1.4 HOW CAN 1,1,1-TRICHLOROETHANE ENTER AND LEAVE MY BODY?

1,1,1-Trichloroethane can quickly enter your body if you breathe in air containing it in vapor form. It also enters your body if you drink water or eat food containing 1,1,1-trichloroethane. If you spill 1,1,1-trichloroethane on your skin, most of it quickly evaporates into the air, but small amounts enter your body through your skin. Regardless of how 1,1,1-trichloroethane enters your body, nearly all of it quickly leaves your body in the air you exhale. The small

amount that is not breathed out can be changed in your body into other substances, known as metabolites. Most of the metabolites leave your body in the urine and breath within a few days. Chapter 2 provides further information on how 1,1,1-trichloroethane can enter and. leave the body.

1.5 HOW CAN 1,1,1-TRICHLOROETHANE AFFECT MY HEALTH?

If you breathe air containing high levels of 1,1,1-trichloroethane (1,000 ppm or higher) for a short time you may become dizzy and lightheaded, and ,possibly lose your coordination. These effects will rapidly disappear after you stop breathing contaminated air. If you breathe in much higher levels of 1,1,1-trichloroethane, either intentionally or accidentally, you may become unconscious, your blood pressure may decrease, and your heart may stop beating. We do not know whether harmful effects result from breathing low levels of 1,1,1-trichloroethane for a long time. Studies in animals show that breathing air that contains very high levels of 1,1,1-trichloroethane (higher than 2,000 ppm) damages the breathing passages and causes mild effects in the liver, in addition to affecting the nervous system. We do not know if breathing air containing 1,1,1-trichloroethane affects reproduction or development in people. However, when rats were exposed to high levels of 1,1,1-trichloroethane in air, their offspring developed more slowly than normal. Similar exposure of pregnant rabbits delayed the setting of the bone structure of their offspring. These effects on the developing offspring of rats and rabbits were seen only at quite high levels that, in most cases, were toxic to the mother. There are no studies of people that tell us whether eating food or drinking water contaminated with 1,1,1-trichloroethane could cause harmful health effects. However, exposures to people who work with 1,1,1-trichloroethane do not usually cause harmful effects. In animals, placing large amounts of 1,1,1-trichloroethane in the animal’s stomach has caused effects on the nervous .system, mild liver damage, unconsciousness, and even death. If your skin comes into contact with 1,1,1-trichloroethane, you might feel some irritation. Studies in animals suggest that repeated exposure of the skin might affect the liver and that very large amounts on the skin can cause death. These effects only occurred when evaporation was prevented.

Available information does not indicate that 1,1,1-trichloroethane causes cancer. The International Agency for Research on Cancer (IARC) has determined that 1,1,1-trichloroethane is not classifiable as to its carcinogenicity in humans. The EPA has also determined that 1,1,1-trichloroethane is not classifiable as to its human carcinogenicity. The likelihood that exposure to levels of 1,1,1-trichloroethane found near hazardous waste sites would cause significant health effects is very low. You can find more information on the health effects of 1,1,1-trichloroethane in Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO 1,1,1-TRICHLOROETHANE?

Samples of your breath, blood, and urine can be tested to determine if you have recently been exposed to 1,1,1-trichloroethane. In some cases, these tests can estimate how much 1,1,1-trichloroethane has entered your body. To be of any value, samples of your breath or blood have to be taken within hours of exposure, and samples of urine have to be taken within 1 or 2 days after exposure. These tests will not tell you whether your health will be affected by exposure to 1,1,1-trichloroethane. The exposure tests are not routinely available in hospitals and clinics because they require special analytical equipment. See Chapters 2 and 6 for more information about tests for exposure to 1,1,1-trichloroethane.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The Environmental Protection Agency (EPA) sets regulations on the levels of 1,1,1-trichloroethane which are allowable in drinking water. The highest level of 1,1,1-trichloroethane allowed in drinking water is 0.2 ppm. The EPA has decided that the level of 1,1,1-trichloroethane in lakes and streams should not be more than 18 ppm. This level would prevent possible harmful health effects from drinking water and eating fish contaminated with 1,1,1-trichloroethane. Any releases or spills of 1,1,1-trichloroethane of 1,000 pounds or more must be reported to the National Response Center. 1,1,1-Trichloroethane levels in the workplace are regulated by the Occupational Safety and Health Administration (OSHA). The

workplace exposure limit for an 8-hour workday, 40-hour workweek is 350 ppm in air. See Chapter 7 for more information on regulations and advisories regarding 1,1,1-trichloroethane.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, E-29
Atlanta, Georgia 30333
(404) 639-6000

This agency can also provide you with information on the location of occupational and environmental health clinics. These clinics specialize in the recognition, evaluation, and treatment of illness resulting from exposure to hazardous substances.